U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE
SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS

HEARING CHARTER

The Fiscal Year 2005 National Institute of Standards and Technology Budget: Views from Industry

April 28, 2004
10:00 a.m. to 12:00 noon
2318 Rayburn House Office Building

Purpose:

On Wednesday, April 28, 2004, the House Science Subcommittee on Environment, Technology, and Standards will hold a hearing to examine the role of the National Institute of Standards and Technology's (NIST) laboratories in serving industry and whether the funding for the NIST laboratories is adequate to support the measurement and standards needs of the U.S. economy. The hearing will also review how the NIST Fiscal Year (FY) 2005 budget request for its laboratory research programs will help support industry, homeland security, and its mission in measurement technology and standards development.

Witnesses:

Mr. Daryl Hatano is the Vice President for Public Policy for the Semiconductor Industry Association.

Dr. Thomas Cellucci is the President and Chief Operating Officer at the Zyvex Corporation, a nanotechnology company located in Richardson, Texas. Dr. Cellucci has worked for several technology companies.

Ms. Deborah Grubbe is the Corporate Director for Safety and Health at DuPont, headquartered in Wilmington, Delaware. Ms. Grubbe is also a member of the NIST Visiting Committee on Advanced Technology (VCAT), an advisory committee established by National Institute of Standards and Technology Act.

Mr. James Jasinski is Vice President of Federal and State Systems for Cogent Systems, a biometrics company headquartered in Pasadena, California. Cogent Systems has worked with NIST on the development of biometrics for the United States Visitor and Immigrant Status Indicator Technology (U.S.-VISIT) program.

Mr. John Biechman is Vice President for Government Affairs for National Fire Protection Association (NFPA). NFPA works with NIST on standards for equipment for firefighters and first responders.

The subcommittee plans to explore the following questions:

1. What specific services do NIST's laboratories provide to U.S. industries? Are there other sources of these services?

2. Is NIST's FY 05 budget request keeping pace with its basic mission, as well as its additional responsibilities in such areas as homeland security, voting standards, cybersecurity, and nanotechnology?

3. What are the impacts of the FY 04 appropriation on NIST's ability to meet its mission requirements? What will be the long-term implications for NIST and for U.S. technological and economic competitiveness if future funding is not increased?

4. What technological opportunities are not being fully exploited because of NIST's current level of funding?

Background

The law creating the National Institute of Standards and Technology (NIST, then named the National Bureau of Standards) was signed March 3, 1901. NIST has two laboratory campuses, one in Gaithersburg, MD, and the other in Boulder, CO, and a joint institute with the University of Colorado at Boulder, the Joint Institute for Laboratory Astrophysics (JILA). NIST scientists have won two Nobel prizes since 1997.

The NIST laboratory programs are organized into eight laboratories that conduct research in a wide variety of physical and engineering sciences. The labs respond to industry needs for measurement methods, tools, data, and technology. NIST helps to produce and support voluntary standards for industrial applications. NIST researchers collaborate with colleagues in industry, academia, and other government agencies. The eight NIST laboratories are:

- Building and Fire Research Laboratory
- Chemical Sciences and Technology Laboratory
- Electronics and Electrical Engineering Laboratory
- Information Technology Laboratory
- Manufacturing Engineering Laboratory
- Materials Science and Engineering Laboratory
- Physics Laboratory
- Technology Services Laboratory.

In addition, NIST houses three major facilities that play a critical role in measurement and standards research, as well as supporting technology development for future industries. These are the Atomic Clock, the Neutron Spallation Source, and the Advanced Measurements Laboratory (AML), which is scheduled to open later this year. The construction of the AML was funded through the NIST Construction account. The total cost of the AML was $235 million.

NIST is also the home of the Advanced Technology Program (ATP) which funds joint R&D projects with industry; the Manufacturing Extension Partnership (MEP) program, which provides technical assistance to small and medium-sized manufacturers; and the Baldrige National Quality Program (BNPQ) which assists companies and other organizations with quality management.

The NIST laboratories are funded out of the Science, Technology, and Research Services (STRS) account in the NIST budget and received $338 million in FY 04. The NIST labs also receive some funds (about $40 million) from the ATP to work on specific projects. Federal agencies provide NIST with roughly an additional $100 million in return for NIST technical assistance, spread among a range of projects on a reimbursable basis. The NIST labs also receive approximately $60 million a year from various companies in return for fee-for-service work and use of NIST's scientific resources.

Recent Events and Issues

The FY 04 Appropriation Cut Funding for NIST's Laboratories.
The FY 04 appropriation for NIST's lab account was $338.6 million, a cut of 5.2 percent ($20 million) from the FY 03 appropriation. This appropriation was also $49 million below the President's request. Attached is a detailed account, provided by NIST, of how the impacts of the FY 04 budget would be absorbed by its laboratories, and the resulting cuts to laboratory programs. A few examples are:

- The elimination of the Information Technology Laboratory's (ITL) Computer Security Expert Assistance Team (CSEAT) which would have provided federal agencies with hands-on guidance on remediating cybersecurity vulnerabilities.
- A substantial reduction in the availability of the NIST Center for Neutron Research to internal and external scientists who study the structure and function of advanced materials.
- The elimination of NIST's contribution to the UNICAT X-ray facility at Argonne National Laboratory, which may result in the breakup of the UNICAT consortium.
- Layoffs of up to 100 scientists at NIST.

The cuts in the FY 04 appropriation are even greater than they appear. First, $21.5 million is earmarked for congressionally mandated projects. Second, NIST did not receive the $9 million it needed to cover federally mandated pay increases and inflationary increases in the costs of doing research. These increases are calculated each year as "Adjustments to Base" or "ATBs" and usually included in the Administration's budget request. Since 1998, the cumulative shortfall in appropriated ATBs has amounted to nearly $42 million. These shortfalls must be absorbed by NIST programs, including the laboratories.

The FY 05 President's Budget Request, if Funded, Would Help Restore This Cut
The Administration's FY 05 budget request includes $422 million for the core NIST laboratory functions - an increase of about $84 million, or almost 25 percent. This would restore the steep funding cuts that NIST's base programs sustained in FY04.

The proposed request must cover the cost-of-living increase for federal employees, the one-time costs associated with purchasing equipment for the new Advanced Measurement Laboratory (AML), the loss of internal NIST funding from the proposed elimination of the Advanced Technology Program (ATP), and the costs of laying off employees who worked on ATP. The entire remainder of the proposed increase would be needed to restore the cuts made to NIST's base programs in FY 04.

Research of Particular Interest to Congress

NIST Supports Standards for Biometrics

Biometrics is a term used to describe the automated methods of recognizing a person based on physiological or behavioral characteristics. Among the features measured are: faces, fingerprints, hand geometry, handwriting, irises, retinas, veins, and voices. Achieving sufficient accuracy and reliability in biometric technology has been a challenge, but NIST has been working with industry to develop standards to meet these challenges. NIST has more than 10 years of experience in biometrics, including work on the rapid and accurate transmission of biometric data to facilitate cooperation between local, state, and federal law enforcement agencies. NIST is also carrying out mandatory work under the USA-PATRIOT Act (P.L. 107-56) to develop and certify technology standards to verify the identities of visa applicants and other persons seeking to enter the U.S., and is currently running tests using face and fingerprint data, with future tests planned for iris scanning devices.

NIST currently has no funding of its own for biometrics, but gets about $5 million in other agency funding. The FY 05 request for NIST includes $1 million to enhance NIST's biometrics work including investigations of how to use "multi-modal" biometrics (techniques that combine two or more measurements simultaneously e.g. finger print and iris scan).

NIST Helps Develop Standards for Equipment for First Responders

For the Department of Homeland Security (DHS), NIST is facilitating the development of a suite of national standards that establish minimum performance requirements for respirators and other essential equipment designed to protect first responders against chemical, biological, radiological, nuclear and explosive (CBRNE) hazards. Announced on February 26, 2004, the first of these DHS standards—three for respiratory equipment and five for protective clothing—incorporate expertise and technical contributions from private-sector standards organizations and federal agencies. This kind of work helps reduce complexity for pubic safety organizations and procurement officials, ensuring consistency by linking and cross-referencing corresponding performance specifications. These standards incorporate work by the National Fire Protection Association (NFPA) and the National Institute of Occupational Health and Safety (NIOSH).

The FY 05 request includes $7.5 million to develop improved CBRNE measurements and guidance to detect and disable these threats. This work will help instrument manufacturers, analysis laboratories, and government agencies determine instrument accuracy and sensitivity.

NIST Reviews the Performance of Fire, Smoke, and Other Detection Systems

NIST is involved in many aspects of technology and testing to support the mission of firefighters and other first responders. Much of this is done through the Building and Fire Research

Laboratory, although other NIST labs also contribute. For example, NIST recently completed a two-year, comprehensive survey of smoke detector performance, the first such review in 25 years. NIST found that ionization smoke detectors work more quickly for flaming fires than do photoelectric alarms. Photoelectric alarms, on the other hand, often provide faster response time to smoldering fires. The tests also showed that the typical contents of a home burned hotter and faster than 25 years ago, giving occupants less time to escape a burning building safely. This study was partly sponsored by the NFPA, the U.S. Fire Administration, and the Consumer Product Safety Commission. Because of budget cuts, however, NIST will have to delay a similar evaluation of explosive and flammable vapor detectors, and will have to cut the national fire grants programs again.

Nanotechnology Development Needs NIST Expertise and Facilities

Cutting-edge nano-scale manufacturing, particularly in electronics, is rapidly approaching the boundaries of what is measurable and thus what can be built. NIST is pushing those boundaries by developing new ways to measure increasingly small things. NIST is also working on new ways to fabricate materials at the nanoscale with increasing precision and consistency. The FY 04 appropriation cut funding for the Electronics and Electrical Engineering Laboratory, the Materials Science and Engineering Laboratory, and delayed work at the Manufacturing Engineering Laboratory in this field. All three of these labs have critical contributions to make to the development and support of a nanotechnology industry.

The FY 05 request, however, includes a $12 million increase for nanotechnology work by these three labs, plus a one-time, $25 million sum for the purchase of the equipment that will establish the new Advanced Measurements Laboratory (AML) as a world-class facility.

NIST Supports Standards for the Chemical Industry

NIST's Chemical Science and Technology Laboratory (CSTL) is the primary reference laboratory for chemical measurements in the U.S. Its calibration services and library of standard reference materials are a resource to which all chemistry-related measurements can be traced and verified. This provides the fundamental basis for scientific certainty, consistency, and accuracy in the chemical industry, academia, and government research. Reference materials and calibrations provide traceability to the International System of Units (SI), which is essential to fair trade. CSTL maintains and develops standards for chemical processes, maintaining the U.S. standard for temperature, humidity, pressure and vacuum, fluid flow, air speed, liquid density and volume, all things that govern industrial production technologies. CSTL's scientists support existing and develop new reference methods and standards for clinical diagnosis and other medical applications, ensuring the quality of healthcare and pharmaceuticals in the U.S.

As a result of the FY 04 appropriation and staff reductions, CSTL has had to delay work related to the natural gas and refrigerant industries, and severely reduce its programs in computational biology and bioinformatics, both areas identified as having strong potential for economic growth and the production of new and more precise methods of drug development. The FY 05 request includes $1.6 million for standards for such diagnostics technologies as portable test kits for infectious diseases, glucose, and cholesterol monitoring. NIST will also conduct tissue engineering-related materials chemistry research for implants that do not provoke rejection.

Cybersecurity
NIST runs a variety of cybersecurity-related projects, but the FY 04 appropriation cut the Information Technology Laboratory by more than $3 million, causing a reduction in these efforts. NIST's Computer Security Expert Assistance Team (CSEAT) program, which was supposed to provide Federal Agencies with hands-on expert guidance to remediate security vulnerabilities, is being eliminated. The recently enacted Federal Information Security Management Act (FISMA) mandated the development of checklists and guidelines for the procurement of commercial off-the-shelf (COTS) security technologies. This work will also be delayed.

The FY 05 request includes a $6 million increase for Computer Science and Applied Mathematics for the delayed cybersecurity activities, as well as the development of wireless security and cryptographic standards for small, mobile devices such as BlackBerries and cellular phones.

Other Federal Agencies Rely on NIST
NIST does work for other Federal agencies, but the money for these projects varies from year to year. Funding from federal sources increased from $70 million in FY 1998 to about $115 million in FY 2003, as agencies came increasingly to rely upon NIST scientists. Funding in FY 04 decreased slightly to about $110 million.

The reduction in NIST's base funding may impair its future ability to provide expert assistance to Federal agencies. This is already the case with cybersecurity (see above). NIST has also had to delay its involvement in the development of armor, structural, and projectile applications for the Department of Defense by the Materials Science and Engineering Lab. NIST is trying to manage the RIF process by allowing some of its most senior scientists to take early retirement. Although this will reduce the number of involuntary lay-offs, it means these individuals will not be there when agencies come to NIST seeking their advice.

Other NIST Budget Issues

The Manufacturing Extension Partnership (MEP) Program Has Been Cut
The MEP program is a network of 400 centers and satellite offices, often partnered with universities and community colleges, offering technical assistance to small and medium-sized manufacturers. MEP helps businesses become more efficient and develop new capabilities, making them competitive in the increasingly global economy. The MEP centers are funded on a cost-shared basis with NIST providing one-third of the funds. States and fees charged to the manufacturers, make up the remainder, so every federal dollar leverages approximately two dollars from other sources. The FY 04 appropriation for MEP cut the program by more than 60 percent, from $106 million to $39 million. As a result, more than half of the MEP centers and offices may have to close. The Administration is seeking additional funds within existing budgets that could be used to support MEP centers, and recently announced that the Economic Development Agency (EDA) would open its grants to MEP centers. Only about $5 million remains this fiscal year, but $45 million is expected to be available in FY 05, although MEP centers would have to go through a competitive application process to secure these funds.

The FY 05 request maintains funding at the reduced level of $39 million, maintaining the impact of the cut. MEP offices have already had to lay off staff and reduce services because of the FY 04 cut.

Advanced Technology Program (ATP)
Congress established ATP in 1988 to restore and enhance the competitiveness of the U.S. economy. It is a competitive grant program that funds cost-shared technology development projects with companies to advance promising technologies to bridge the gap between the research laboratory and the marketplace. ATP seeks to develop pre-competitive, emerging, and high-risk technologies that promise significant commercial payoffs and widespread benefits. ATP is designed to support technical research, not product development. The FY 04 appropriation funded ATP at $179 million, but the Administration request for FY 05 eliminates the program entirely.

Voting Technology Standards Have Not Been Funded
The FY 04 appropriation and FY 05 request did not include money for voting standards, a critical part of the Help America Vote Act (HAVA). The development of new voluntary standards was intended to increase the reliability of new voting equipment that States are required to buy under HAVA. NIST's Information Technology Lab was cut by $3 million in FY 04, which meant that NIST could not even continue the work it had already started in voting standards development in FY 03. The Science Committee has worked with NIST to shift $350,000 in internal money for FY 04 to allow some continuity in this project, and provide some technical assistance to the newly-created Election Assistance Commission. However, $1.8 million is needed if a comprehensive standards development process for voting technology is to begin in FY 05.

World Trade Center Investigation
NIST is in the process of completing its technical investigation of the collapse of the World Trade Center, and the Station Nightclub fire in West Warwick, Rhode Island. Under the National Construction Safety Team (NCST) Act, NIST is responsible for conducting investigations of events causing building failures that result in substantial loss of life or pose the potential for substantial loss of life. The NIST investigations will establish the likely technical causes of the building failure and evaluate the technical aspects of emergency response and evacuation procedures in the wake of such failures. The goal is to recommend improvements to the way in which buildings are designed, constructed, maintained and used. NIST received $4 million in the FY 04 appropriation, which is expected to be sufficient to complete the investigation this year.

Witness Questions

In their letters of invitation, all the witnesses were asked to respond to the following questions:

1) Describe how your company or organization has worked with NIST and how NIST's work has assisted your company or organization.

2) Are NIST research and services available elsewhere and to what extent would you use these if NIST were unable to provide them? Are there limitations or drawbacks to using these alternatives?

3) How have or how will the reductions in NIST's funding affected its ability to support your company or organization? How would the proposed Fiscal Year 2005 increases help?

4) If NIST had more resources and staff available on a consistent basis, what kinds of new work would you want NIST to do in the future?